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Date: October 30, 2000  
 Docket No.: 2950-0175P

09/698263  
10/03/00

Assistant Commissioner for Patents  
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 Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

Inventor(s): KIM, Byung Jin  
 SEO, Kang Soo; YOO, Jea Yong

For: METHOD FOR SUPPORTING A STILL PICTURE OF DATA STREAM  
 RECORDED IN A DISK RECORDING MEDIUM

Enclosed are:

- A specification consisting of 13 pages
- 04 sheet(s) of Formal drawings
- An assignment of the invention
- Certified copy of Priority Document(s)
- Executed Declaration   Original    Photocopy
- A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27
- Preliminary Amendment
- Information Disclosure Statement, PTO-1449 and reference(s)

Other

The filing fee has been calculated as shown below:

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TOTAL CLAIMS	14 - 20 =		0		x18 = \$ 0.00	or	x 9 = \$ 0.00	
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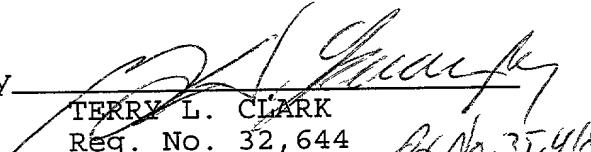
Please charge Deposit Account No. 02-2448 in the amount of \$           . A triplicate copy of this transmittal form is enclosed.

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Respectfully submitted,

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METHOD FOR SUPPORTING A STILL PICTURE OF DATA STREAM  
RECORDED IN A DISK RECORDING MEDIUM

BACKGROUND OF THE INVENTION

**1. Field of the Invention**

5        The present invention relates to a data recording method for enabling a digital television to present a part of digital data stream recorded in a disk such as a high-density digital versatile disk (HD-DVD) as a still picture, and a method for providing a digital television with still information based on  
10 the recorded data stream.

**2. Description of the Related Art**

15        A high-density digital versatile disk (HD-DVD), whose recording standard is under discussion among related companies, is a high-capacity storage device for moving pictures of large size, so that it will be widely used soon. In the meantime, a  
20 disk reproducing device (referred as 'HDVD player' hereinafter) which is being developed to reproduce a high-density digital versatile disk is expected to be connected with a digital television through IEEE 1394 standard when it playbacks an inserted disk.

When a HDVD player is connected with a digital television to playback a HD-DVD, it should have specific video pictures to be displayed as still images on a screen of a digital television. Examples of the specific video pictures are a 5 background image of menu bars for selection of various functions provided from a HD-DVD, and a menu screen for editing a content scenario of a moving picture program recorded in a HD-DVD.

To embody still picture of data stream recorded in a 10 DVD-ROM which is being popularized more and more, a still mark is written behind a data stream section corresponding to a still picture, and a DVD-ROM player, which can reproduce a DVD-ROM disk, repeats to output the last-decoded stream section if a still mark is detected while reproducing recorded programs.

15 This method is possible since a DVD-ROM player has been developed in expectation that it is to be connected with an analog television not equipped with a MPEG decoder so that it has a MPEG decoder as an internal component, therefore, a DVD-ROM player can detect still marks contained in data stream 20 while decoding data stream recorded in a DVD-ROM disk.

However, a HDVD-player may not have a MPEG decoder as an 25 internal component since it is under development on assumption that it may be connected a digital television equipped with a MPEG decoder through a digital interface such as IEEE 1394 as aforementioned.

Therefore, even though still marks are inserted in every 30 data stream section corresponding to still picture in a HD-DVD as in a DVD-ROM, a HDVD player can not conduct still operation if it has not a decoder, that is, it can not detect the still mark.

In addition, a digital television developed at present can not support still function for data stream when it receives data stream from a HDVD player connected through a digital

interface, so that it is urgently required to develop a method of presenting a specific data stream section from a disk device such as a HDVD player in a still picture at a digital television.

#### SUMMARY OF THE INVENTION

5 It is an object of the present invention to provide a method of recording still information, which is identifiable at a digital television, in a high-density disk, and a method for enabling a digital television to present a part of digital stream corresponding to a still picture received through a 10 digital interface such as IEEE 1394 as a still picture based on the furnished still information or data stream.

A still picture supporting method according to the present invention, when recording video data in an optical disk, writes still information indicating that a video data stream 15 section is to be presented as a still picture, and writes information in a cell on whether there is a still picture in a stream object containing the video data stream section wherein the cell is linked with the stream object.

Another still picture supporting method according to the 20 present invention, when recording video data in an optical disk, records video data in a streaming format, and writes a transport packet indicating that a data section among the recorded video data is a still picture at a neighboring side of the data section, wherein the contents of the transport packet is not decoded when 25 reproducing the recorded video data.

Another still picture supporting method according to the present invention, when reproducing data stream recorded in an optical disk comprising recorded video data stream; still information indicating that a video data stream section among 30 the recorded video data stream is to be presented as a still picture; and information written in a cell on whether there is a still picture in a stream object containing the video data

stream section wherein the cell is linked with the stream object, checks whether a video data reproduced from the disk is corresponding to a still picture, and conducts an iteration of transmitting a predictive picture data of the reproduced video data repeatedly after transmitting the reproduced video data based on the checked result.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention, illustrate the 10 preferred embodiments of the invention, and together with the description, serve to explain the principles of the present invention.

In the drawings:

FIG. 1 shows a digital television and a HDVD player to 15 which a method for supporting a still picture of data stream recorded in a disk according to the present invention is applied;

FIG. 2 shows a format example of a recorded stream to embody a still picture supporting method according to the 20 present invention;

FIG. 3A shows a format example of a recorded stream to embody another still picture supporting method according to the present invention;

FIG. 3B shows an information example written in a cell 25 associated with a stream object containing a still picture data; and

FIG. 4 shows a transmission example of a recorded stream corresponding to a still picture according to another embodiment of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

In order that the invention may be fully understood, preferred embodiments thereof will now be described with reference to the accompanying drawings.

5 FIG. 1 shows a digital television 200 and a HDVD player 100 to which a method for supporting a still picture of data stream recorded in a disk according to the present invention is applied. The digital television 200 and the HDVD player 100 are connected each other through a IEEE 1394 digital interface.

10 The data written in a HD-DVD which is to be playbacked in the HDVD player 100 is grouped into high-density stream objects (called 'HOBs' hereinafter). A HOB may correspond to a single program or a digital stream recorded from recording start to stop, and it is to be associated with each cell which 15 is used for determining the playback sequence of moving picture contents recorded in a HD-DVD.

FIG. 2 shows a format example of a recorded stream to embody a still picture supporting method according to the present invention.

20 As shown in FIG. 2, the data stream belonging to a certain HOB contains a still packet as still information. The function of a still packet is to command the digital television 200 to repeat to decode a stream constituting a single picture following the still packet instead of advancing the 25 reproduction, and a still packet contains still duration information indicating how long the requested still operation lasts. The still duration is classified into two types of the definite and the indefinite. The definite type may have time value ranging from 1 to 254 seconds, and the indefinite type 30 is used in a condition that a key command from a user is necessary.

When the data stream recorded as in FIG. 2 is reproduced in the HDVD player 100 and is transmitted to the digital

television 200 through the isochronous channel of the IEEE 1394 digital bus, the still packet is also transmitted to the digital television 200 without being decoded. When the digital television 200 receives the still packet while decoding the 5 received data stream into real video and/or audio signal, it extracts still duration information from the received still packet. After that, the digital television 100 decodes data stream section, which is following the still packet, corresponding to a single picture and then repeats outputting 10 the just-decoded video picture during the time indicated by the extracted still duration information.

If the time indicated by the still duration information expires, the digital television 200 stops repeating of decoding of same picture, and then resumes to decode next pictures, which 15 may have been already stored in an internal buffering memory, succeeding the still picture.

Through the above-explained operations, a picture can be held as a still picture in a digital television for a certain time.

20 In the above-explained embodiment of the still picture supporting method, an additional command for holding a picture and resuming successive decoding needs not be sent from the HDVD player 100 to the digital television 200.

Instead of positioning a still packet before a still 25 picture, a still packet may be preceded by a still picture. In this case, the HDVD player 100 may turn its mode into a pause without advancing next pictures as soon as it identifies a packet as a still one based on a packet header. And the digital television 200 repeats decoding a partial data stream, which 30 is received prior to a still packet, constituting a single picture when the received packet is determined as a still one. This interoperation between the HDVD player 100 and the digital television 200 can also achieve still function.

The still packet may not contain information on still duration. Instead, the HDVD player 100 resumes data reproduction from recorded data following the still packet and transmits the reproduced data stream to the digital television 200 if a user requests release of still status. According to the resumption of data reproduction, the digital television 200 receives data packets next to the still packet, then it acknowledges the reception of data packet as release of still picture, and decodes the received data packets as soon as it stops repetition of decoding of one picture.

FIG. 3A shows another format example of a recorded stream to embody a still picture supporting method according to the present invention.

As explained above referring to FIG. 2, the data written in a HD-DVD which is to be playbacked in the HDVD player 100 is grouped into HOBs. A HOB is also corresponding to a single program or a digital stream recorded from recording start to stop, and it is related with each cell which is used for determining the playback sequence of moving picture contents recorded in a HD-DVD.

And, a HOB is composed of high-density stream object units (referred 'HOBUs' hereinafter), and a data stream constituting a HOBU is recorded across a lot of data packs as shown in FIG. 3A. A data pack is a data accessing unit whose size is physically readable and/or writable at a time, that is, it is corresponding to a sector of a DVD-ROM. Each data pack consists of a pack header and several transport packets written in it.

The pack header comprises fields of 'STILL Indicator', 'SYS\_PCR\_base', 'SYS\_PCR\_ext', and 'Reserved'. A transport packet may contain a program clock reference (PCR) which consists of a 9-bit extension value and a 33-bit base value according to the MPEG standard. The extension value is a

modulo-300 counter that is incremented at a rate of 27 MHz, whereas the base value is incremented at a rate of 90 KHz. If a transport packet contains a PCR, the PCR is copied to the fields of 33-bit 'SYS\_PCR\_base' and 9-bit 'SYS\_PCR\_ext', respectively. The field of 'STILL Indicator' is a 1-bit flag and is used to indicate whether or not a data pack has data stream to be transmitted repeatedly. That is, if the flag is 1, it means that the pack and following packs including data of Infra-coded picture (I-picture) and predictive pictures (P-pictures) should be transmitted repeatedly.

In addition, a cell associated with a HOB containing one or more still pictures consists of general information and still picture entry point information as shown in FIG. 3B. The general information has various information on reproduction sequence of still pictures, whether there is still picture or not, and the number of still pictures. And, the still picture entry point information has information indicating all of HOBUs in which data stream sections corresponding to still pictures are written. The information on whether there is still picture or not and the number of still pictures is written in 1-byte field of 'Still\_YES'.

Therefore, when reproducing a HD-DVD, the HDVD player 100 examines information written in a cell to know whether there is still picture and where still picture is written among a lot of HOBUs, and searches for a corresponding HOBU based on the known information. Then, it examines the successive pack headers belonging to the HOBU to know whether the value of 'STILL Indicator' field is 1 or not.

If the value is 1, the HDVD player 100 reads data stream section containing I-picture data and next P-picture data only and then repeats to transmit the read data stream section to the digital television 200 as shown in FIG. 4. The I-picture data is composed of a sequence header, a header of group of

1 pictures (GOP), and real video data, and the P-picture data is  
2 composed of a header and predictive real data.

3 The transmission ratio of I-picture to P-picture is 1:15.  
4 That is, a I-picture is transmitted once every 15 transmission  
5 of P-picture. When transmitting the I-picture repeatedly, the  
6 HDVD player 100 generates a PCR whose value is transporting time  
7 of each transport packet constituting the I-picture, and  
8 inserts it into every packets or every a few packets. When  
9 transmitting P-pictures repeatedly, the HDVD player 100  
10 transmits P-picture header only without transmitting  
11 predictive real data.

12 The information of transmitting repetition duration,  
13 i.e., still duration may be written in a cell or a pack header.  
14 If this information has been written, the HDVD player 100  
15 resumes next reproduction after stopping the transmitting  
16 repetition when the still duration expires, if has not, it  
17 resumes next reproduction when a user requests to do that.

18 In this embodiment of still picture supporting method,  
19 the digital television 200 needs not conduct an additional  
20 operation for still mode, instead, it just conducts a normal  
21 operation to decode the received data stream section provided  
22 repeatedly from the HDVD player 100.

23 The still picture supporting method according to the  
24 present invention makes it possible to present a background  
25 image of menu bars for selection of various functions provided  
from a HD-DVD and a menu screen for editing a content scenario  
of a moving picture program recorded in a HD-DVD as a still  
picture on a digital television on condition that a HDVD player  
is delivering real data in the format of data stream to a digital  
30 television connected through a digital interface such as IEEE  
1394.

31 The invention may be embodied in other specific forms  
32 without departing from the spirit or essential characteristics

thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come 5 within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

**What is claimed is:**

1. A method of writing information for supporting still picture of data stream recorded in an optical disk, comprising 10 the steps of:

(a) writing still information indicating that a video data stream section is to be presented in a still picture; and

(b) writing information in a cell on whether there is a still picture in a stream object containing the video data 15 stream section, the cell being linked with the stream object.

2. The method set forth in claim 1, wherein said step (b) further writes information indicating the location of the video data stream section in the cell.

3. The method set forth in claim 1, wherein said step (a) 20 writes the still information in a header of a sector in which the video data stream section is written.

4. The method set forth in claim 1, wherein the video data stream section to be presented as a still picture consists of Infra-coded picture data and predictive picture data.

25 5. A disk device comprising recorded video data stream, still information indicating that a video data stream section among the recorded video data stream is to be presented as a still picture, and information written in a cell on whether there is a still picture in a stream object containing the video 30 data stream section wherein the cell is linked with the stream object.

6. The disk device set forth in claim 5, further comprising information indicating the location of the video

data stream section, the location information being written in the cell.

7. The disk device set forth in claim 5, wherein the still information is written in a header of a sector in which the video 5 data stream section is written.

8. A method of writing information for supporting still picture of data stream recorded in an optical disk, comprising the steps of:

(a) recording video data in a streaming format; and  
10 (b) writing a transport packet indicating that a data section among the recorded video data is a still picture at a neighboring side of the data section, wherein the contents of the transport packet is not decoded when reproducing the recorded video data.

15 9. A disk device comprising video data recorded in a streaming format, and a transport packet indicating that a data section among the recorded video data is a still picture, wherein the transport packet is written at a neighboring side of the data section and the contents of the transport packet 20 is not decoded when reproducing the recorded video data.

10. A data reproducing method for supporting still picture of data stream recorded in an optical disk, comprising the steps of:

(a) checking whether a video data reproduced from the 25 disk is corresponding to a still picture; and

(b) conducting an iteration of transmitting a predictive picture data of the reproduced video data repeatedly after transmitting the reproduced video data based on the checked result.

30 11. The method set forth in claim 10, wherein the iterative transmission ratio of the video data to the predictive picture data is 1:N wherein N is greater than 1.

12. The method set forth in claim 10, wherein said step

(b) transmits header information only without sending the predictive data when transmitting the predictive picture data repeatedly.

13. The method set forth in claim 10, wherein said step  
5 (b) conducts the transmitting iteration during still time  
specified in still information written in the disk.

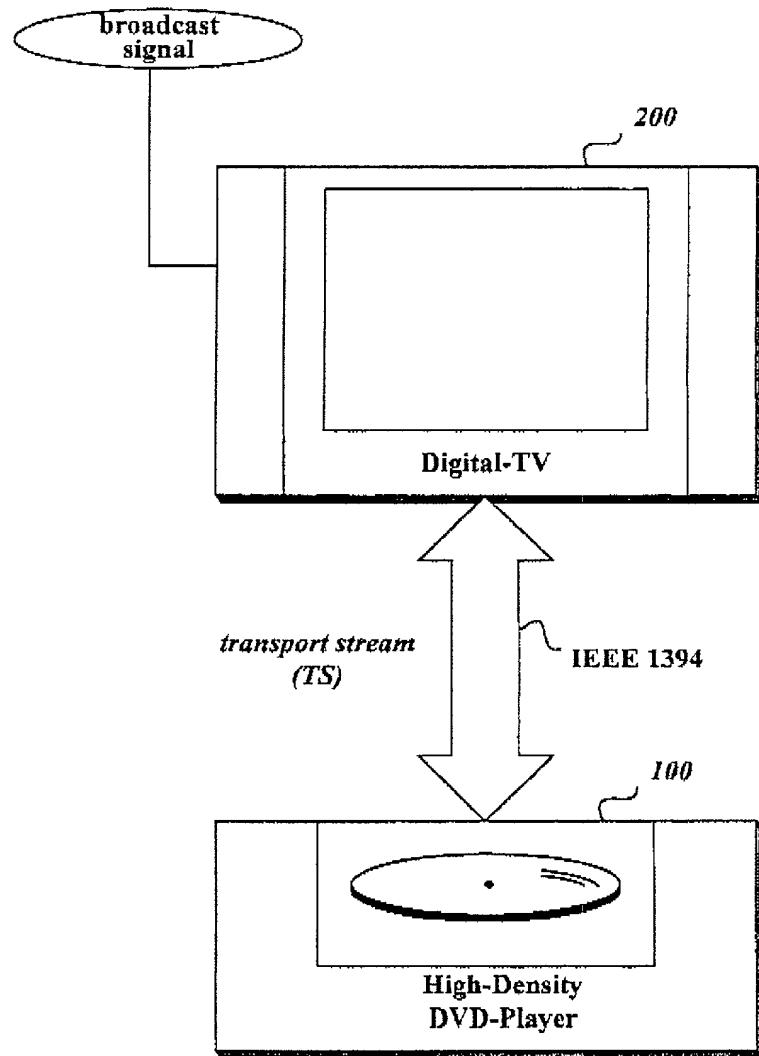
14. The method set forth in claim 10, wherein said step  
(b) conducts the transmitting iteration until a user requests  
release of still mode.

## ABSTRACT OF DISCLOSURE

The present invention relates to a data recording method for enabling a digital television to present a part of digital stream recorded in a disk such as a high-density digital 5 versatile disk (HD-DVD) as a still picture, and a method for providing a digital television with still information based on the recorded data stream. The still picture supporting method, when reproducing a high-density disk comprising recorded video data stream; still information indicating that a video data 10 stream section among the recorded video data stream is to be presented as a still picture; and information written in a cell on whether there is a still picture in a stream object containing the video data stream section wherein the cell is linked with the stream object, checks whether a video data 15 reproduced from the disk is corresponding to a still picture, and conducts an iteration of transmitting a predictive picture data of the reproduced video data repeatedly after transmitting the reproduced video data based on the checked result.

According to the still picture supporting method, it is 20 possible to present a background image of menu bars for selection of various functions provided from a HD-DVD and a menu screen for editing a content scenario of a moving picture program recorded in a HD-DVD as a still picture on a digital television on condition that a HDVD player is delivering real 25 data in the format of data stream to a digital television connected through a digital interface such as IEEE 1394.

**FIG. 1**



**FIG. 2**

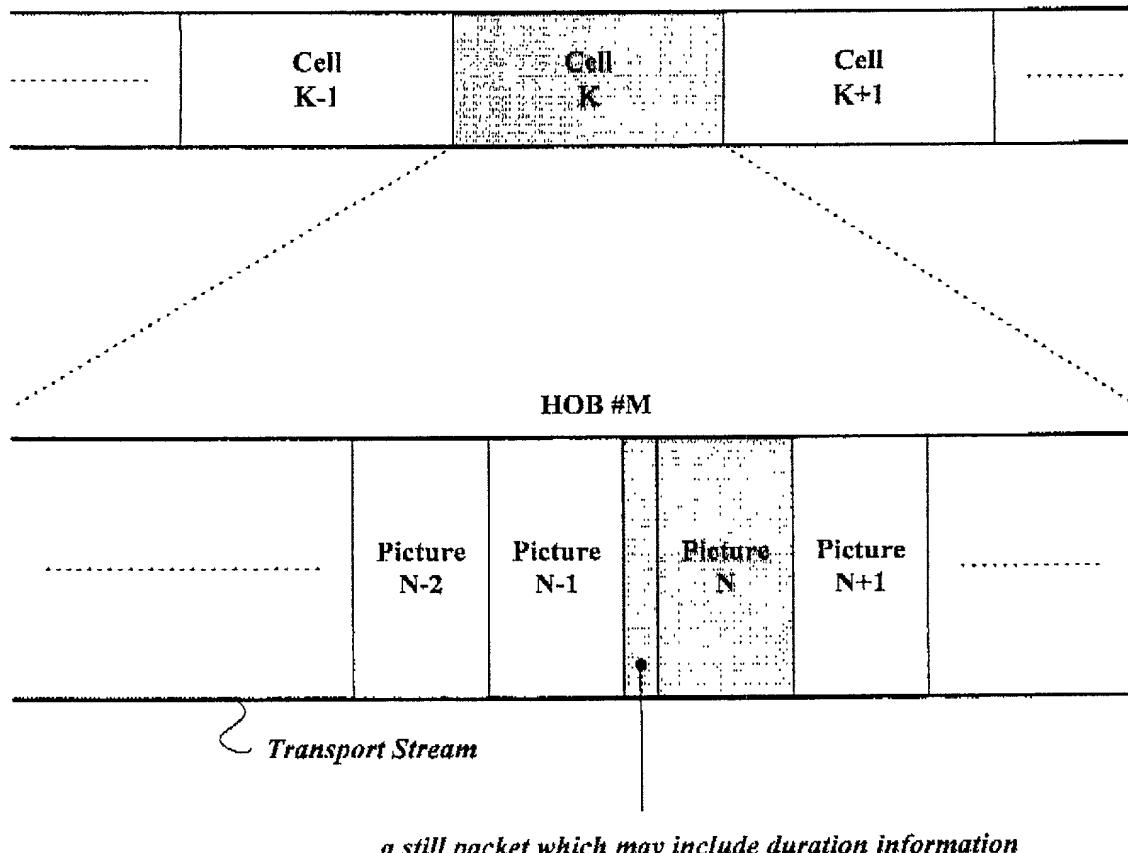


FIG. 3A

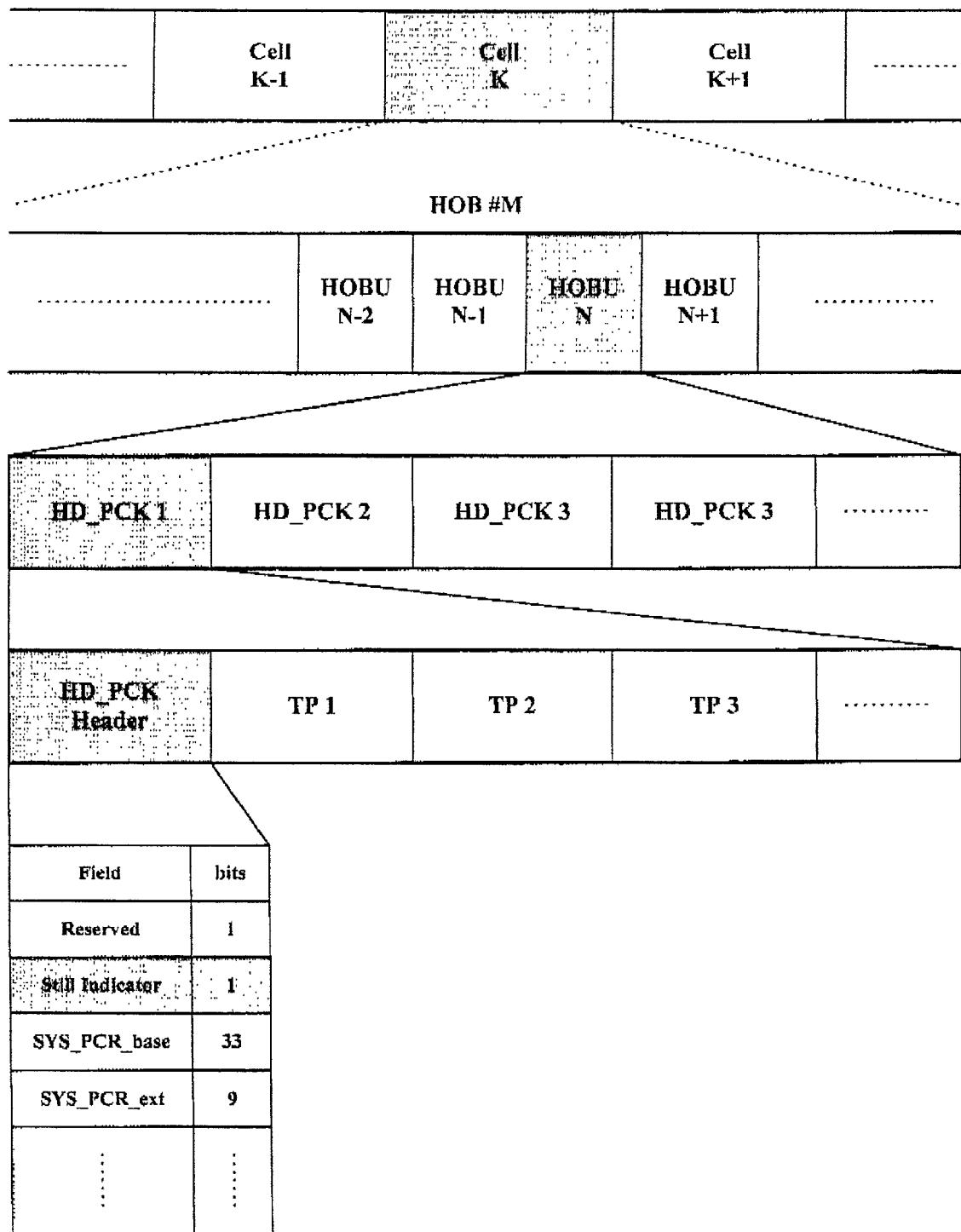


FIG. 3B

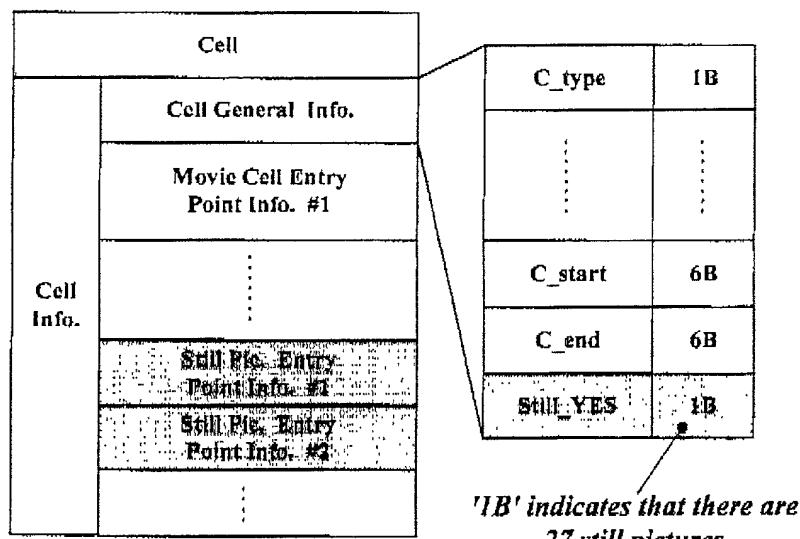
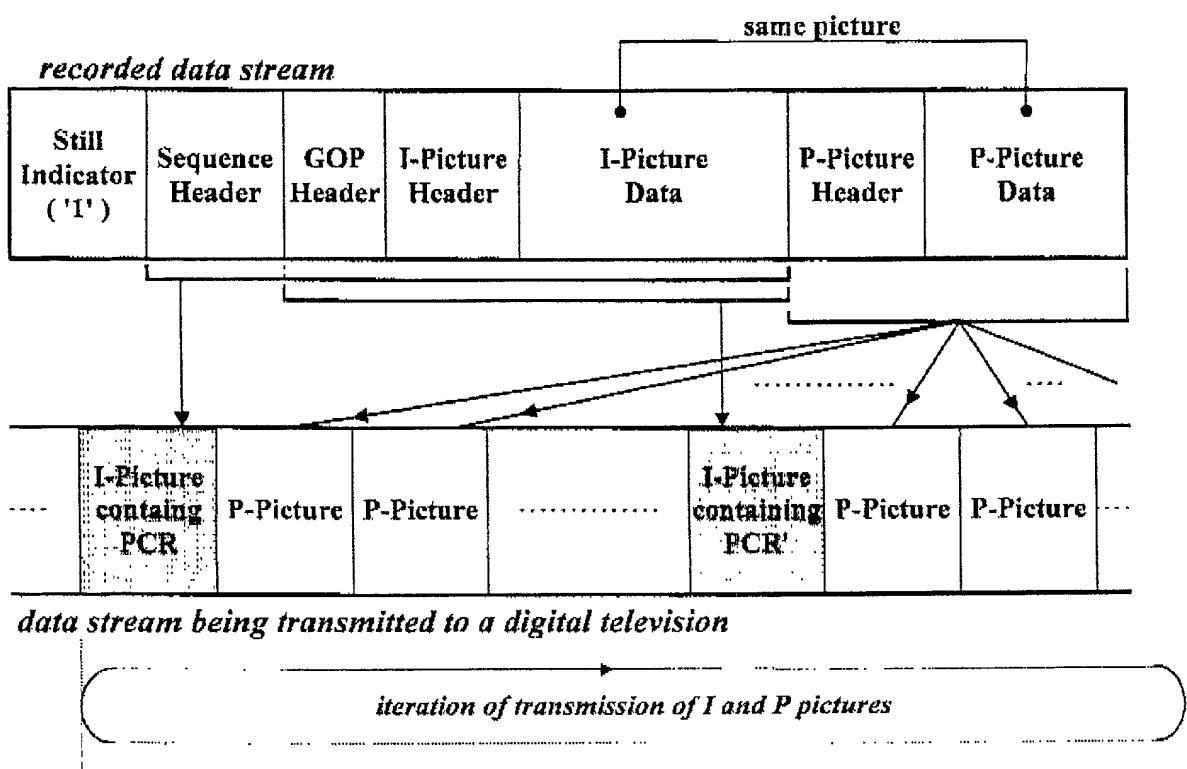


FIG. 4



Attorney Docket No.

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METHOD FOR SUPPORTING A STILL PICTURE OF DATA STREAM RECORDED  
 IN A DISK RECORDING MEDIUM  
 the specification of which is attached hereto, if not attached hereto,  
 the specification was filed on \_\_\_\_\_ as  
 United States Application Number \_\_\_\_\_  
 and amended on \_\_\_\_\_ (if applicable) and/or  
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I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

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Prior Foreign Application(s)			Priority Claimed	
<u>99-47843</u>	<u>Korea</u>	<u>10/30/99</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(Number)	(Country)	(Month/Day/Year Filed)	Yes	No
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	_____	Yes	No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

Insert Provisional  
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 (If any)

<u>_____</u>	<u>_____</u>
(Application Number)	(Filing Date)
<u>_____</u>	<u>_____</u>
(Application Number)	(Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

Country	Application Number	Date of Filing (Month/Day/Year)
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_____	_____	_____

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I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Insert Prior U.S.  
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 (If any)

<u>_____</u>	<u>_____</u>	<u>_____</u>
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
<u>_____</u>	<u>_____</u>	<u>_____</u>
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

## Attorney Docket No.

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

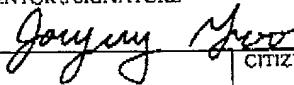
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 101 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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